# The Retention of Lamellibranch Larvae in the Niantic Estuary[1]

BY

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(1 Map)

Marshall & Wheeler (1965) found that phytoplankton were most abundant in the inner stretches of the Niantic estuary; *i. e.,* on the upriver side of the shoals that set off the estuarine basin from the outer Bay (see Map). Phytoplankton concentrations, somewhat less than those occurring in the basin and commonly different in composition, were also found in the Bay, while numbers generally decreased over the shoals. Conditions favoring reproduction in the inner estuary, particularly for the dinoflagellates so numerous there, plus the general lack of dispersal from this semi-enclosed area may account for much of the abundance observed in the basin area.

Data gathered by the senior author on the dispersal of common planktonic lamellibranch larvae show little or nothing when examined for correlations with data on light, depth, salinity and stage of tide. However, on noting the distributions of each species on early dates of the summer spawning season, it is clear that the larvae are consistently most abundant in the basin and upriver stations in spite of extreme irregularities in other respects (Table 1). In this way the larval distributions grossly parallel those of the phytoplankton. For these planktonic larvae it seems unlikely that this distribution is the direct result of a concentrated spawning activity in the inner estuary. The spawning bay scallops, *Aequipecten irradians,* are concentrated on the shoals. The spawning oysters, *Crassostrea virginica,* are scattered on the intertidal rocks throughout the estuary. The shipworm, *Teredo,* is ubiquitous but may be most abundant just inshore from the inlet where there are many docks and pilings. The minute pelecypod identified as *Mysella (Rochefortia) planulata* is thought to be ubiquitous, judging from observations of Phelps (1964) on a nearby estuary.

Marshall & Wheeler (1965) suggested that there might be a differential tidal effect with the flood being more effective than the ebb in the transport of phytoplankton across the shoals. This may be even more significant in the distribution of the planktonic larvae observed and perhaps for holoplankton as well. At the beginning of the flood less than a foot of water covers the shoals. On the flooding tide, waters of relatively high salinities come in from the Bay, cross the shoals and apparently move up estuary along the bottom. With the ebb, surface waters from the basin cross the shoals and move seaward but may tend to remain near the surface. Waters in the Bay, semi-enclosed by headlands, are not immediately swept from the area, so these surface waters may return on the following flood. This simple effect should carry plankton well into the estuary and tend to keep them there. It would tend to be operative irrespective of the vertical movements of the plankton unless they were strongly grouped toward the surface.

The flushing of the estuary tends to counter the hydrographic effect just described. Using runoff data from U. S. Geological Survey Water supply records, it is calculated, with the method of Ketchum (1951), that 25 days are required for water entering from the tributaries to reach the Bay during times of low runoff such as characterize the spawning period. This does not seem strong enough to counter a tidal mechanism but it may be sufficient to account for the numbers of larvae in the Bay late in the summer.

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Table 1

The number of lamellibranch larvae per m³ as sampled at four stations along the axis of the Niantic estuary during the Summer 1963. See Map for station locations[3].

| | *Mysella planulata* (Stimpson, 1851) | | | *Teredo navalis* Linnaeus, 1758 | | | *Crassostrea virginica* (Gmelin, 1791) | | | *Aequipecten irradians* (Lamarck, 1819) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Bay | Shoals | Basin and Upriver | Bay | Shoals | Basin and Upriver | Bay | Shoals | Basin and Upriver | Bay | Shoals | Basin and Upriver |
| 10 June | 4 | | 422 | 2 | | 39 | 0 | | 7 | 0 | | 0 |
| 14 June | 6 | 0 | 710 | 6 | 0 | 62 | 0 | 0 | 1 | 0 | 0 | 7 |
| 21 June | 2 | 232 | 650 | 6 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 2 |
| 1 July | 4 | 32 | 1416 | 24 | 0 | 62 | 6 | 4 | 9 | 2 | 4 | 6916 |
| 8 July | 2 | 88 | 2222 | 6 | 12 | 36 | 0 | 0 | 11 | 0 | 0 | 37 |
| 15 July | 54 | 124 | 9542 | 10 | 0 | 39 | 0 | 0 | 6 | 0 | 0 | 9 |
| 22 July | 6 | 440 | 2218 | 56 | 60 | 39 | 4 | 4 | 6 | 0 | 4 | 22 |
| 29 July | 154 | 304 | 764 | 22 | 180 | 56 | 4 | 20 | 15 | 2 | 0 | 21 |
| 6 August | 160 | 112 | 244 | 143 | 16 | 10 | 12 | 16 | 23 | 0 | 8 | 0 |
| 12 August | 84 | 148 | 690 | 42 | 60 | 41 | 32 | 72 | 169 | 0 | 32 | 31 |
| 15 August | 36 | 52 | 472 | 46 | 64 | 74 | 20 | 56 | 188 | 14 | 20 | 59 |
| 26 August | 22 | 0 | 95 | 74 | 4 | 39 | 4 | 0 | 4 | 8 | 0 | 546 |
| 3 September | 58 | 24 | 31 | 64 | 12 | 33 | 16 | 0 | 5 | 0 | 0 | 17 |
| 18 September | 10 | 4 | 18 | 4 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |

[3] Samples from both the surface and off the bottom were taken at the Bay, Basin and Upriver stations. Since differences did not follow significant patterns they are averaged in this presentation. For the same reason Basin and Upriver data are averaged.

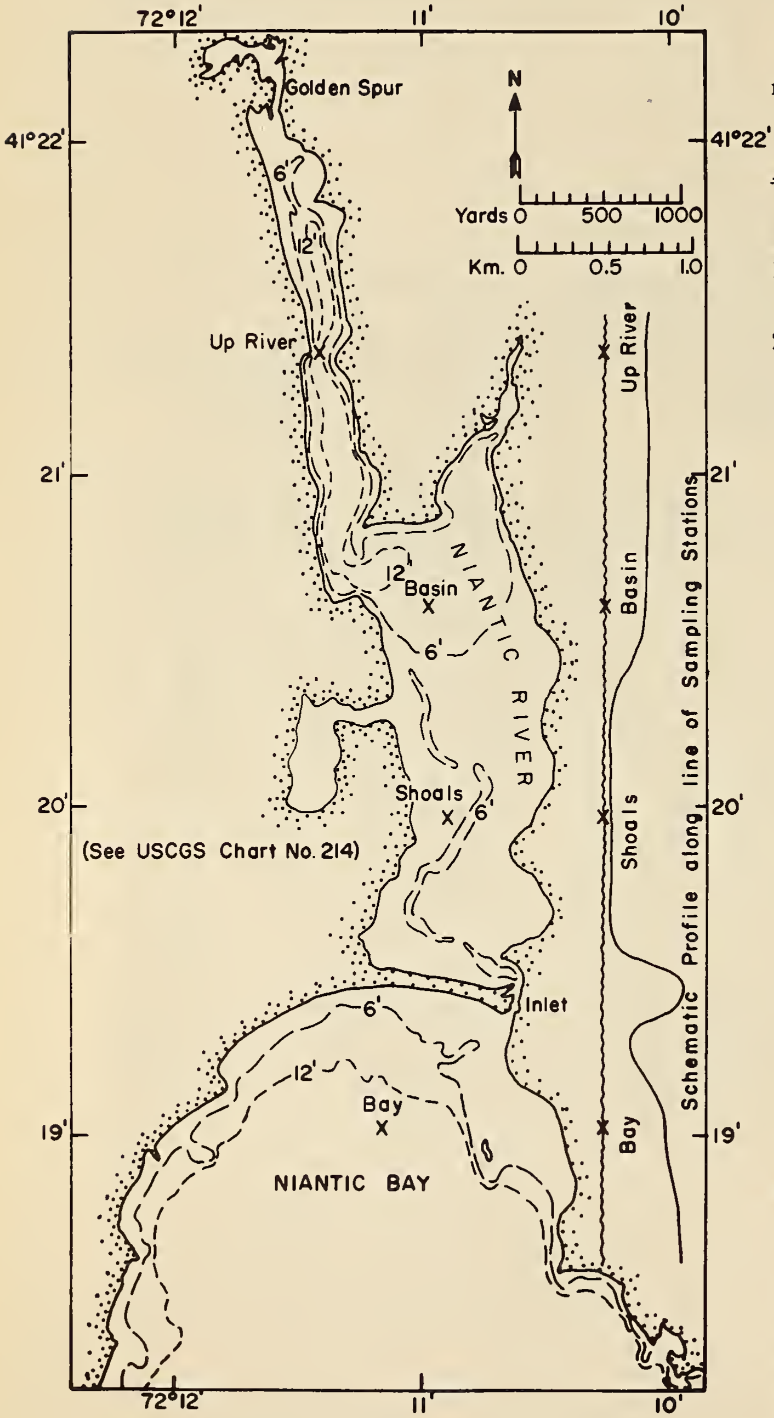


Table 2

Σ-τ values as observed along the axis of the Niantic estuary during the lamellibranch larvae sampling, Summer 1963. For each date and station the upper reading is for the upper depth, the lower reading for the lower depths. See Map for station locations and approximate total depths.

| | Station | | | |
|---|---|---|---|---|
| Date | Bay | Shoals | Basin | Upriver |
| 14 June | 21.528 | 19.738 | 16.505 | 16.209 |
| | 22.279 | | 21.523 | 21.257 |
| 21 June | 21.282 | 21.705 | 20.173 | 18.699 |
| | 22.052 | | 21.151 | 21.489 |
| 1 July | 20.063 | 18.973 | 18.074 | 18.166 |
| | 21.408 | | 20.317 | 20.477 |
| 8 July | 21.224 | 21.324 | 20.261 | 19.171 |
| | 21.900 | | 21.032 | 21.185 |
| 15 July | 20.888 | 20.256 | 20.211 | 19.346 |
| | 21.604 | | 20.856 | 20.932 |
| 22 July | 21.528 | 21.509 | 19.176 | 18.138 |
| | 21.922 | | 21.039 | 21.003 |
| 29 July | 20.292 | 19.106 | 18.895 | 17.941 |
| | 21.429 | | 20.306 | 20.429 |
| 6 Aug. | 21.022 | 20.628 | 19.500 | 18.672 |
| | 21.446 | | 20.241 | 20.358 |
| 12 Aug. | 20.632 | 19.837 | 20.269 | 19.748 |
| | 21.560 | | 20.712 | 20.844 |
| 15 Aug. | 21.355 | 20.349 | 20.517 | 19.724 |
| | 21.672 | | 21.079 | 21.022 |
| 26 Aug. | 21.782 | 21.011 | 20.207 | 20.308 |
| | 22.044 | | 20.462 | 21.017 |
| 3 Sept. | 21.464 | 21.494 | 21.042 | 20.567 |
| | 22.643 | | 21.384 | 21.451 |
| 18 Sept. | 22.301 | 22.272 | 21.833 | 21.611 |
| | 22.458 | | 22.211 | 22.254 |

## LITERATURE CITED

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